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Checking Mountain Soil Moisture Under the Snow, an important factor in snowmelt runoff.

Federal-State Cooperative
Snow Surveys and Water Supply Forecasts

Montana and Northern Wyoming Upper Missouri, Upper Columbia and Yellowstone Rivers

SOIL CONSERVATION SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE
AND
MONTANA AGRICULTURAL EXPERIMENT STATION

In cooperation with the U. S. Forest Service, U. S. Geological Survey, National Park Service, U. S. Bureau of Reclamation, State Engineers of Montana and Wyoming and other Federal, State and local Organizations.

AS OF
FEB. 1. 1956

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

TO RECIPIENTS OF COOPERATIVE SNOW SURVEY
AND WATER SUPPLY FORECAST REPORTS:

Snow surveys in the West are conducted each year at more than 1200 snow courses. Basin and Province or State snow survey reports summarizing the results of the measurements and forecasts of seasonal runoff and water supply are issued by the Soil Conservation Service, U. S. Department of Agriculture and some of its co-operators; the Water Rights Branch of the British Columbia Department of Lands and Forests; and the California Division of Water Resources.

Copies of the various federal-state cooperative snow survey reports listed below may be secured by writing to:

Head, Water Supply Forecasting Section
Soil Conservation Service
209 S. W. 5th Avenue
Portland 4, Oregon

BASIN REPORTS:

Colorado, Rio Grande, and Platte-Arkansas River Basins	Issued monthly February through May by SCS and Colorado Experiment Station, Fort Collins, Colorado.*
Columbia River Basin	Issued monthly January through May by Soil Conservation Service, Boise, Idaho.*
Upper Missouri River Basin	Issued monthly February through May by SCS and Montana Agricultural Experiment Station, Bozeman, Montana.*
West-Wide Water Supply Outlook	Issued April 1 by Soil Conservation Service and Cooperators, Portland, Oregon.

STATE REPORTS:

Arizona	Issued semi-monthly January 15 through April 1 by SCS and Salt River Valley Water Users Association, Phoenix, Arizona.*
Nevada	Issued monthly February through April by SCS and Nevada State Engineer, Reno, Nevada.*
Oregon	Issued monthly January through May by SCS, Portland, Oregon, and Oregon Agricultural Experiment Station.*
Utah	Issued monthly January through May by SCS, Salt Lake City, Utah, and State Engineer of Utah and Utah Agricultural Experiment Station.*
Washington	Issued monthly February through May by SCS, Spokane, Washington, and State Department of Conservation and Development.*
Wyoming	Issued monthly February through May by SCS, Casper, Wyoming, and State Engineer of Wyoming.*

*Special reports are issued as needed.

The British Columbia reports are issued February 1 through June 1 and may be secured from Comptroller, Water Rights Branch, Department of Lands and Forests, Parliament Buildings, Victoria, B.C.

The California reports are issued monthly February 1 through May 1 and may be secured from Division of Water Resources, California Department of Public Works, Sacramento, California.

The annual water supply forecasts of the Weather Bureau are available in monthly bulletins published from January through May. These bulletins entitled, "Water Supply Forecasts for the Western United States" may be obtained from River Forecast Center, Weather Bureau, 712 Federal Office Building, Kansas City 6, Missouri.

FEDERAL - STATE COOPERATIVE

SNOW SURVEYS and WATER SUPPLY FORECASTS

for

MONTANA AND NORTHERN WYOMING

(Upper Missouri and Upper Columbia River Basins)

Report Prepared by:

A. R. Codd
Hydraulic Engineer
Soil Conservation Service

and
O. W. Monson
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Montana Agricultural
Experiment Station

Soil Conservation Service
U. S. Department of Agriculture
and
Montana Agricultural Experiment Station
Bozeman, Montana

Report issued by:

Truman C. Anderson
State Conservationist
of Montana

M. M. Kelso, Director
Montana Agricultural
Experiment Station

WATER SUPPLY OUTLOOK
as of
FEBRUARY 1, 1956

There is an above average snow pack at this date on the snow-fed streams of Montana. Snow pack accumulation during January was above average. Everything points to an excellent irrigation water supply for this season. The snow pack over the Missouri River mountainous area is about twice that of last season. The Columbia Basin snow pack is heavier on the Clark Fork than on the Flathead Drainage.

Reservoir storage is generally good for February first. Mountain stream flow during the winter months has been above median flow.

JEFFERSON RIVER:

The 1956 snow pack on the Jefferson Basin is close to twice that of last season and should produce a good water supply during the runoff season.

MADISON RIVER:

Snow survey courses in Yellowstone Park and other basins of the Madison show an excellent snow pack for the 1956 season. The pack shows twice as much water content as last season and 150 per cent of average years.

GALLATIN RIVER:

The 1956 snow pack over the Gallatin is exceptionally good. The water content this month shows 220 per cent of last season; 140 per cent of 1954, and 150 per cent of the average occurrence. Without reservoir regulation the usual late summer shortage will probably occur.

MISSOURI MAIN STEM:

The Missouri Basin from Three Forks to Ft. Benton has an excellent snow pack for February first. The water content is much better than last season by twice, 130 per cent of 1954, and shows this year 140 per cent of the average snow pack.

UPPER YELLOWSTONE RIVER:

Snow surveys made by Park rangers show a record snow pack in many places in this watershed. There are almost three times as much snow as last season. At Lewis Lake Divide, toward the southern portion of the Park, there are 139 inches of snow and 50⅔ inches of water content. This is a record high depth but in 1927 this snow course on February 16, showed 132 inches of snow with 60 inches of water. No year in the past 15 has come close to these figures.

COLUMBIA BASIN

FLATHEAD RIVER:

The Flathead River Basin, in the vicinity of Kalispell, is not as large as might be anticipated. An average of its seven courses measured on February first, shows that this season the water content was 175 per cent of last season; 77 per cent of 1954, and 106 per cent of a very short average. This condition would indicate that we can plan on more water than last season but not as much as 1954. If we are fortunate in receiving an average accumulation of snow during February and March, and average precipitation during April and May, an estimate of inflow into Hungry Horse Reservoir would be approximately 2,200,000 acre feet.

CLARK FORK RIVER:

The 1956 snow pack on the Clark Fork River, in the vicinity of Missoula, is considerably higher than on the Flathead River Basin. Thirteen snow courses were measured February first on several tributary basins of the Clark Fork River and they were all exceptionally high. Comparing the average water content of all these courses with last season shows 245 per cent of last year; 111 per cent of 1954, and 155 per cent of the average of 15 years of record. This is a very healthy condition and streams should produce an excellent water supply this coming spring and summer.

MONTANA SNOW SURVEYS - FEBRUARY 1, 1956

MISSOURI BASIN DRAINAGE BASIN AND SNOW COURSE	No.	Elev.	Date of Survey	SNOW COVER MEASUREMENTS 1956 Snow Depth (In.)	Water Content (In.)	Past Record Water Content 1955	1954	15-Year Average 1938-52	Total Years of Record
JEFFERSON RIVER									
(Rock-Beaverhead)									
*Kilgore	11E12	6200	2/2	29	7.0	6.1	4.0	7.3	19
*Camp Creek	12E3	6800	1/30	32	7.9	3.9	6.3	6.4	20
(Big Hole)									
Gibbons Pass	13D2	7100	1/30	71	22.7	7.6	19.0	14.8*	16
*Moose Creek	13D16	6200	2/1	55	15.0	5.9	13.1	10.0*	10
MADISON RIVER									
Hebgen	11E5	6550	1/28	41	10.6	5.9	8.5	7.6	21
W. Yellowstone	11E7	6700	1/27	48	12.7	5.3	8.3	7.8	18
21-Mile	11E6	7150	1/27	61	18.7	7.6	13.5	11.1	18
**Big Springs	11E9	6500	1/28	70	20.5	9.1	14.1	12.8	20
**Island Park	11E10	3600	1/29	58	17.8	7.8	12.4	10.1	20
**Valley View	11E8	6500	1/29	54	13.9	5.7	8.2	10.2*	10
Norris Basin	10E2	7500	1/31	39	9.9	4.5	8.9	8.5*	6
GALLATIN RIVER									
Devil's Slide	10D4	8100	1/29	53	16.2	8.9	12.3	--	3
Hood Meadow	10D3	6600	1/28	29	6.2	2.6	4.8	--	3
New World	10D1	6700	2/4	30	9.1	3.6	5.1	7.9*	8
21-Mile	11E6	7150	1/27	61	18.7	7.6	13.5	11.1	18
MISSOURI RIVER MAIN STEM									
Chessman Res.	12C5	6200	2/2	17	4.0	1.3	3.6	3.3	20
Picnic Grounds	13C6	6500	2/1	25	5.5	1.6	5.1	3.2*	11
Pipestone Pass	12D1	7200	1/31	24	5.8	1.6	2.4	3.0*	16
Tenmile, Lower	12C2	6250	2/1	27	6.1	2.5	5.3	4.8	20
Tenmile, Middle	12C3	6800	2/1	37	9.6	3.6	7.2	7.0	21
Tenmile, Upper	12C4	8000	2/1	42	11.9	5.4	8.6	8.8	21
(Marias River)									
Marias Pass	13A5	5250	1/31	48	13.3	6.5	19.7	11.8	21

*Average is for less than 15 years of record in the 1938-52 period.
**Adjacent Basin.

MONTANA SNOW SURVEYS - FEBRUARY 1, 1956

MISSOURI BASIN DRAINAGE BASIN AND SNOW COURSE	No.	Elev.	Date of Survey	1956 Snow Depth (In.)	SNOW COVER MEASUREMENTS Water Content (in.)	Past Record Water Content 1955	1954	15-Year Average 1938-52	Total Years of Record
UPPER YELLOWSTONE									
Canyon	10E3	7750	2/1	56	16.0	7.8	11.5	10.1*	10
Cooke City	10D7	7400	1/31	32	8.9	3.4	8.2	5.8*	9
Lake Camp	10E4	7850	2/1	56	15.0	3.2	7.4	8.4*	11
Lodgepole, Wyo.	9E1	8200	2/1	45	12.6	--	--	--	--
Lupine	10E1	7300	1/31	44	13.0	6.1	7.8	6.5*	14
**Lewis Lake Div.	10E9	7000	2/2	139	50.5	16.6	31.9	27.4	26
**Astor Creek	10E8	7700	2/2	106	36.8	10.7	23.4	20.0	26
**Thumb Divide	10E7	7900				8.2	17.3	18.2*	9
LOWER YELLOWSTONE (Shoshone River)									
East Entrance	10E6	7000	2/1	43	12.8	2.9	8.3	9.9*	7
Sylvan Pass	10E5	7100	2/1	50	14.7	4.1	9.5	10.9*	12

*Average is for less than 15 years of record in the 1938-52 period.
**Adjacent Basin

MONTANA SNOW SURVEYS - FEBRUARY 1, 1956

MISSOURI BASIN DRAINAGE BASIN AND SNOW COURSE	No.	Elev.	Date of Survey	SNOW COVER MEASUREMENTS 1956 Snow Depth (In.)	1956 Water Content (In.)	Past Record Water Content 1955	1954	15-Year Average 1938-52	Total Years of Record
LOWER YELLOWSTONE (Wind River)									
Big Warm	9F12	8800	2/1	41	10.6	1.7	--	--	1
Brooks Lake	10F8	9200	1/31	74	23.8	9.7	15.3	17.2*	15
Burroughs Creek	9F4	8800	2/2	54	17.0	4.4	11.0	13.2*	7
DuNoir	9F6	8750	2/1	37	8.9	1.0	5.5	6.7*	14
Geyser Creek	9F7	8500	2/1	36	8.9	1.5	5.5	6.8*	7
Little Warm	9F8	9500	2/1	60	17.9	5.0	11.1	16.9*	6
Sheridan R.S. #2	9F14	7500	1/31	36	8.3	2.3	5.1	5.7	14
T-Cross Ranch	9F3	8000	2/2	33	8.3	2.2	6.2	5.1*	15
Togwotee Pass	10F9	9600	1/30	86	29.4	11.6	21.1	19.2	20
LOWER YELLOWSTONE (Greybull River)									
Timber Creek #1	9E2	8800	1/30	20	2.7	0.9	N.R.	3.7*	4
Timber Creek #2	9E3	8800	1/31	13	1.5	New Course			
Wood River #1	9F1	8000	2/1	22	3.0	1.0	4.9	--	3
LOWER YELLOWSTONE (Nowood Creek)									
Munkres Pass	7E8	9700	2/3	37	9.0	N.R.	N.R.	4.8*	1
Onion Gulch	7E27	8100	2/3	36	8.2	New Course			
Tensleep Lake	7E26	9075	2/5	38	9.4	New Course			
Tensleep R.S.	7E7	8300	2/5	32	6.6				
LOWER YELLOWSTONE (Shell Creek)									
Bald Mountain	7E21	9600	1/27	56	14.3	New Course			
Beaver-Tongue Div.	7E20	9200	1/27	54	14.1	"	"		
Bone-Spring Div.	7E18	9200	1/26	52	13.6	"	"		
Granite Pass	7E17	8950	1/26	52	13.5	"	"		
LOWER YELLOWSTONE (Porcupine Cr.)									
Five Spgs.Falls	7E31	7500	1/31	20	4.6	"	"		
Medicine Wheel	7E30	9000	1/27	43	10.2	"	"		

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MONTANA SNOW SURVEYS - FEBRUARY 1, 1956

MISSOURI BASIN DRAINAGE BASIN AND SNOW COURSE	No.	Elev.	Date of Survey	SNOW COVER MEASUREMENTS 1956 Snow Depth (In.)	Water Content (In.)	Past Record Water Content 1955	1954	15-Year Average 1938-52	Total Years of Record
LOWER YELLOWSTONE (Tongue River)									
Big Goose #2	7E32	7700	1/29	31	6.6	New Course			
Burgess R.S. #2	7E33	7900	1/27	29	5.9	4.7	13.4	11.7*	5
Dome Lake #2	7E34	8800	1/29	36	8.0	New Course			
Gloom Creek	7E14	9300	1/25	38	8.9	"	"		
Granite Pass	7E17	8950	1/26	52	13.5	"	"		
Lake Geneva	7E16	9000	1/29	32	7.0	"	"		
North Tongue	7E15	8800	1/27	34	7.6	"	"		
Sibley Lake	7E11	8000	1/25	34	7.3	"	"		
Sucker Creek	7E12	9000	1/25	34	8.0	"	"		
Steamboat Point	7E10	7500	1/25	22	5.0	"	"		
Wood Rock G.S.	7E13	8500	1/28	37	8.6	"	"		
LOWER YELLOWSTONE (Powder River)									
Crazy Woman	7E29	8200	2/2	25	5.2	"	"		
Muddy Creek G.S.	7E28	7800	2/2	20	4.0	"	"		
Munkres Pass	7E8	9700	2/3	37	9.0	N.R.	N.R.	4.8*	1
Onion Gulch	7E27	8100	2/3	36	8.2	New Course			
Soldier Park	7E5	8700	2/4	31	7.6	1.3	1.9	3.1*	5
Sour Dough	7E6	8500	2/3	32	7.7	--	--	--	-

*Average is for less than 15 years of record in the 1938-52 period.

MONTANA SNOW SURVEYS - FEBRUARY 1, 1956

COLUMBIA BASIN DRAINAGE BASIN AND SNOW COURSE	No.	Elev.	Date of Survey	SNOW COVER MEASUREMENTS 1956 Snow Depth (In.)	1956 Water Content (In.)	Past Record Water Content 1955	1954	15-Year Average 1938-52	Total Years of Record
KOOTENAI RIVER (above Libby, Montana)									
Fernie	Can	3500	1/31	41	8.5	6.1	10.7	6.2*	16
Gray Creek	Can	5100	1/31	48	12.9	9.5	18.2	12.7*	7
Marble Canyon	Can	5000	1/31	45	12.7	7.1	12.8	11.9*	8
Nelson Creek	Can	3050	1/30	60	16.5	7.7	15.2	9.8*	17
New Fernie	Can	4100	1/31	51	12.9	8.5	14.3	--	5
Sinclair Pass	Can	4500	1/30	26	5.9	2.7	8.0	4.4*	8
Sullivan Mine	Can	5100	1/31	48	15.0	5.2	11.5	10.1	10
FLATHEAD RIVER									
Basin Creek	13B14	5000	1/31	33	8.3	3.1	12.8	--	5
Coyote Hill	13B10	4200	2/2	37	8.9	4.6	10.1	6.7*	9
Desert Mountain	13A2	5600	1/27	50	12.4	5.8	14.8	10.8*	9
Holbrook	13B13	4530	1/31	31	8.7	5.8	12.0	--	5
Marias Pass	13A5	5250	1/31	48	13.3	6.5	19.7	11.8	21
Quintonkon	13A13	3800	2/2	44	10.3	8.4	8.3	--	4
Spotted Bear Mt.	13B2	7000	2/1	37	10.0	--	--	--	0
Trout Lake	13A12	3600	1/31	42	10.4	8.1	--	--	3
Twin Creeks	13B11	3580	1/31	34	7.8	5.9	12.6	--	5
UPPER CLARK FORK									
Chessman Res.	12C5	6200	2/2	17	4.0	1.3	3.6	3.3	20
Coyote Hill	13B10	4200	2/2	37	8.9	4.6	10.1	6.9*	9
Fish Lake, Idaho	15C2	5000	1/31	88	28.8	15.8	--	--	3
Intergaard	13C4	6450	2/1	28	7.4	2.8	5.9	5.1*	11
**Lookout	15B2	5250	2/1	110	37.5	14.7	38.4	22.4	19
Lubrecht For. #6	13C8	5400	2/2	21	3.7	1.7	4.5	--	4
Picnic Grounds	12C6	6500	2/1	25	5.5	1.6	5.1	3.2*	11
Pipestone Pass	12D1	7200	1/31	24	5.8	1.6	2.4	3.0*	16
Southern Cross	13C5	6500	2/1	26	5.8	2.4	6.2	3.7*	11
Storm Lake #2	13C7	7780	1/30	46	12.4	6.2	8.2	--	3
Stuart Mill	13C6	6500	2/1	25	5.4	2.2	5.4	4.4*	11
Tenmile, Lower	12C2	6250	2/1	27	6.1	2.5	5.3	4.8	20
Tenmile, Middle	12C3	6800	2/1	37	9.6	3.6	7.2	7.0	21
Tenmile, Upper	12C4	8000	2/1	42	11.9	5.4	8.6	8.8	21
BITTERROOT									
Gibbons Pass	13D2	7100	1/30	71	22.7	7.6	19.0	14.8*	16
**Moose Creek	13D16	6200	2/1	55	15.0	5.9	13.1	10.0*	10
PEND OREILLE									
Hoodoo Creek	15C1	6200	1/26	131	44.2				

*Average is for less than 15 years of record in the 1938-52 period.
**Adjacent Basin.

STATUS OF RESERVOIR STORAGE
MISSOURI RIVER IN MONTANA
February, 1956

BASIN & STREAM	RESERVOIR	USABLE CAPACITY 1000's AF	THOUSAND ACRE FEET IN STORAGE ABOUT FEBRUARY FIRST 1956	1955	1954	15-Yr.Avg. 1938-52
MISSOURI RIVER BASIN						
Beaverhead	Lima	84.00	--	11.89	18.60	74.7*
Ruby River	Ruby	38.85				
Madison River	Hebgen Lake	345.00	184.90	172.90	155.10	234.69
Madison River	Ennis Lake	41.00	31.70	38.01	38.54	34.06
Hyalite Creek	Middle Creek		--	4.84	3.30	--
Missouri River	Canyon Ferry	401.70	1,646.0	1,224.0	849.1	--
Missouri River	Hauser & Helena	62.50	61.80	59.60	62.54	48.9*
Missouri River	Lake Helena	10.45	9.62	9.42	10.45	11.8*
Missouri River	Holter Lake	81.92	50.58	74.66	74.89	53.3
N. Fk Sun River	Gibson	105.00	69.21	66.69	76.68	59.6
N. Fk Sun River	Willow Creek	32.30	26.68	23.96	26.41	12.9
N. Fk Sun River	Pishkun	32.00	16.48	19.29	20.59	15.6
Birch Creek	Swift	30.00	20.99	26.96	22.59	19.5
Dupuyer & Birch	Lake Francis	112.00	92.46	95.31	92.16	72.8
Judith River	Ackley Lake	5.82	--	4.58	2.35	4.3*
Missouri River	Ft. Peck	19,000.00	4,677.0	9,344.0	12,180.0	9,456.0*
Milk River	Fresno	127.20	69.55	74.47	79.02	47.2*
Milk River	Nelson	66.80	41.39	49.15	38.82	28.5
W. Rosebud Creek	Mystic Lake	20.80	9.48	5.29	10.11	8.0
Red Lodge Creek	Cooney	27.50	--	--	--	8.1*
Tongue River	Tongue River	73.90	--	7.89	7.09	10.1*
Swiftcurrent Cr.	Sherburne Lake	66.10	--	18.20	--	19.0
MISSOURI RIVER BASIN - WYOMING						
Shoshone River	Buffalo Bill	440.00	139.7	145.8	156.7	277.4
Wind River	Boysen	408.60	81.9	339.6	337.7	--
Wind River	Pilot Butte	31.6	11.7	9.2	8.9	13.0
Bull Creek	Bull Lake	152.00	72.6	66.3	84.9	63.7
Belle Fourche	Key Hole	190.00	18.1	5.0	8.6	--
MISSOURI RIVER BASIN - NORTH DAKOTA						
Heart River	Heart Butte	54.80	46.8	50.6	54.3	--
Heart River	Dickerson	4.3	3.0	2.5	5.7	--
Missouri River	Garrison Lake		524.0			
MISSOURI RIVER BASIN - SOUTH DAKOTA						
Belle Fourche	Belle Fourche	185.00	69.8	51.5	97.1	95.7
Cheyenne River	Angostura	160.00	77.3	31.9	30.0	52.0
Cheyenne River	Deerfield	15.1	--			
Grand River	Shadehill	84.00	--			
Missouri River	Ft. Randall		1,629.1			

*Average is for less than 15 years of record in the 1938-52 period.

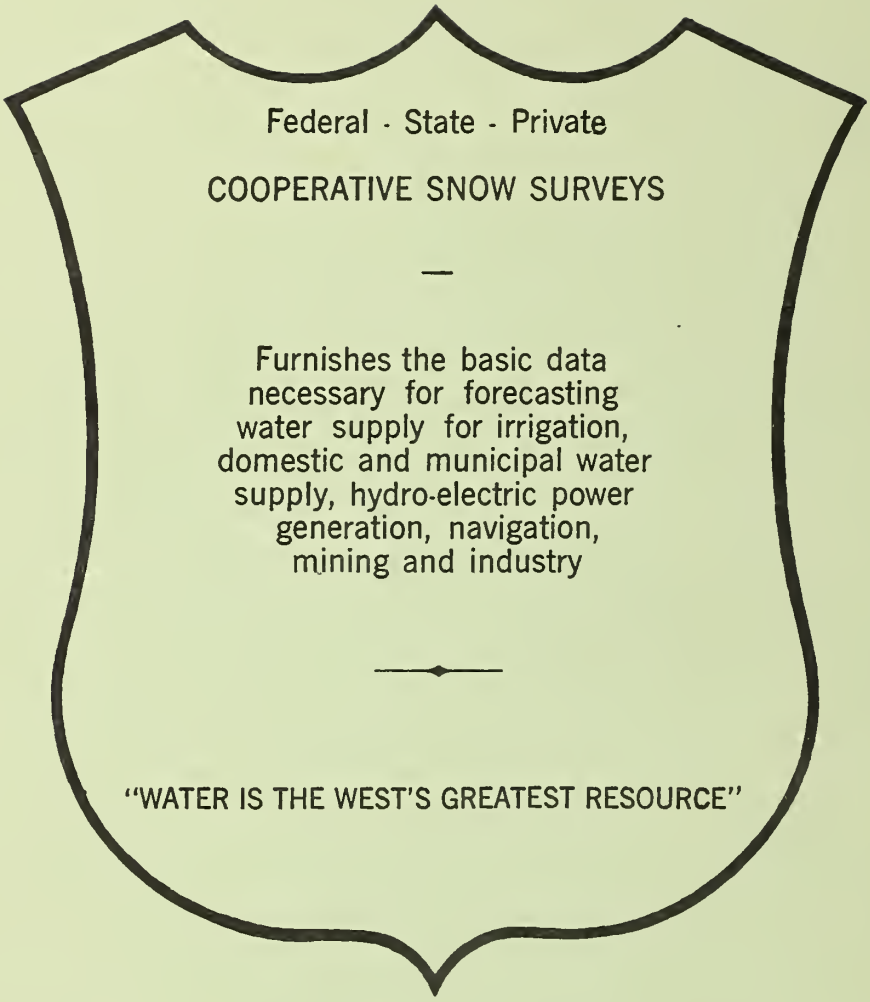
STATUS OF RESERVOIR STORAGE
COLUMBIA RIVER IN MONTANA
February, 1956

BASIN & STREAM	RESERVOIR	USABLE CAPACITY 1000's AF	THOUSAND ACRE FEET IN STORAGE ABOUT FEBRUARY FIRST 1956	1955	1954	15-Yr.Avg. 1938-52
COLUMBIA RIVER BASIN						
Flint Creek	Georgetown Lk	31.00	23.8	22.2	21.1	21.4*
S. Fk. Flathead	Hungry Horse	3,500.00	3,069.0	2,489.0	2,021.0	--
Flathead River	Flathead Lake	1,791.00	925.5	789.0	836.0	704.6*
Flathead River 6/	Camas Res.	42.80	33.8	38.9	30.8	17.8*
Flathead River 7/	Mission Valley	98.60	28.6	55.7	19.1	37.0*
Jocko Creek	Lower Jocko Lk	7.6	0	0	0	-

6/ Camas Reservoirs are shown as a sum of (4) small reservoirs on the west side of Flathead Lake located on Dry Creek and Little Bitterroot River.

7/ Mission Valley Reservoirs are shown as a sum of (8) small reservoirs located south and east of Flathead Lake. Both Camas and Mission Valley reservoirs are operated by the Indian Irrigation Service.

* Average is for less than 15 years of record in the 1938-52 period.


Federal - State - Private
COOPERATIVE SNOW SURVEYS
Furnishes the basic data necessary for forecasting water supply for irrigation, domestic and municipal water supply, hydro-electric power generation, navigation, mining and industry
"WATER IS THE WEST'S GREATEST RESOURCE"